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PATENT COOPERATION TREATY



Translation

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference WO37/005 TWO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/004264	International filing date (day/month/year) 24 April 2003 (24.04.2003)	Priority date (day/month/year) 25 April 2002 (25.04.2002)
International Patent Classification (IPC) or national classification and IPC E04B 1/198		
Applicant HEIKE-WALLNER-AUTOMATION GMBH		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 25 November 2003 (25.11.2003)	Date of completion of this report 10 September 2004 (10.09.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP2003/004264

I. Basis of the report

1. With regard to the elements of the international application:*

☐ the international application as originally filed

☒ the description:

pages 1-32, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

☒ the claims:

pages _____, as originally filed

pages _____, as amended (together with any statement under Article 19

pages _____, filed with the demand

pages 1-34, filed with the letter of 15 April 2004 (15.04.2004)

☒ the drawings:

pages 1/7 - 7/7, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

☐ the sequence listing part of the description:

pages _____, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP 03/04264

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: I.5

- 1 The applicant has filed a main request and a first and a second auxiliary request.

Consequently, in accordance with European Patent Office practice, only the petition designated as the main request is examined in the present PCT proceedings.

- 2 PCT Article 34(2)(b):

- 2.1 The feature included in claims 1 and 14 according to which

"all the connecting points where two or more rod-shaped elements whose longitudinal axes are not mutually coaxial meet"

was disclosed in the originally filed application, on page 1 of the description, between lines 10 and 12.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/EP 03/04264

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-34	YES
	Claims		NO
Inventive step (IS)	Claims	1-26	YES
	Claims	27-34	NO
Industrial applicability (IA)	Claims	1-34	YES
	Claims		NO

2. Citations and explanations

1. Reference is made to the following documents:

D1: DE-A-43 33 029

D2: WO-A-00/55442.

2. Independent claim 1:

2.1 Claim 1 includes several alternatives as a result of the reiteration of the word "or" in said claim 1.

One such alternative is the following (the remaining alternatives have been struck through and the corresponding adjustments indicated in bold type):

"system for constructing a supporting framework or rigid frame (5) from rod-shaped elements (45, 125, 126) which are, or can be, connected to one another and connecting elements (1, 14, 21, 34, 38, 52) which are, or can be, arranged between said rod-shaped elements in the region of all the connecting points where two or more rod-shaped elements whose longitudinal axes are not mutually coaxial meet, in which system

- a) the rod-shaped elements (4, 125, 126) consist of at least one segment of a material derived from tall plants, and

- b) the connecting elements (1, 14, 21, 34, 38, 52) consist of a rigid renewable material,

characterized in that

- c) at least one end of a rod-shaped element (4, 125, 126) **and** a connecting element (1, 14, 21, 34, 38, 52) which is to be connected thereto ~~and/or the end of an additional rod shaped element (4, 125, 126) which is to be joined~~ are machined in such a way that ~~it~~ they comprise(s) surfaces extending, at least in certain areas, along well-defined geometrical bodies,
- d) such that, in the connecting area of a rod-shaped element (4, 125, 126) with a connecting **element** - ~~or with an additional rod shaped element (1, 14, 21, 34, 38, 4, 125, 126)~~ - a surface (11; 76) extending, at least in certain areas, along the outer surface of a cylinder, ~~sphere, prism or pyramid~~ and a surface (11; 75) extending, at least in certain areas, along a hollow cylinder, ~~hollow sphere, hollow prism and/or hollow pyramid~~ are provided on each of the two bodies (4, 125, 126; 1, 14, 21, 34, 38, 52),
- e) said surfaces permitting joining, according to the plug-in principle, with closely adjacent, complementary surfaces which are suitable for providing a locking fit by means of clamping and/or gluing.

- 2.2 In respect of this alternative, document D2, which is considered to be the closest prior art, discloses a system for constructing a supporting framework or rigid frame (5) from rod-shaped elements ["male member", "It is preferred that at least one of the members is elongate ..." (see page 7, line 12); "It will be appreciated that multiple male members may be

inserted into multiple sockets in a female member"
(see page 13, lines 6 to 7)] and connecting elements
["female members" *"the female member has a socket
defined therein by a groove in the form of a closed
loop having opposing walls, the groove being shaped
to receive said projection of the male member such
that the projection of the male member forms a
clearance fit with the socket of the female member"*
(see page 5, lines 16 to 19)] (which are, or can be,
arranged between said rod-shaped elements in the
region of all the connecting points where two or more
rod-shaped elements whose longitudinal axes are not
mutually coaxial meet, in which system

- a) the rod-shaped elements ("male member") consist
of at least one segment of a material derived
from tall plants [*"Both male and female members
may be wooden."* (see page 8, line 12)], and
- b) the connecting elements ("female members")
consist of a rigid renewable material,

and at least one end of a rod-shaped element ("male
member") and a connecting element ("female member")
which is to be connected thereto are machined in such
a way that they have surfaces extending, at least in
certain areas, along well-defined geometrical bodies,

**from which the subject matter of claim 1 differs in
that**

a surface extending, at least in certain areas, along
the outer surface of a cylinder and a surface
extending, at least in certain areas, along a hollow
cylinder are provided on each of the two bodies in
the connecting area of a rod-shaped element ("male
member") with a connecting element ("female member"),

said surfaces permitting joining with closely adjacent, mutually complementary surfaces which are suitable for providing a locking fit by means of gluing.

- 2.3 Although D2 also discloses "a surface extending, at least in certain areas, along the outer surface of a cylinder and a surface extending, at least in certain areas, along a hollow cylinder are provided on each of the two bodies in the connecting area of a rod-shaped element with a connecting element" and joining with closely adjacent, mutually complementary surfaces which are suitable for providing a locking fit by means of gluing (as in claim 1 of the present application), this is achieved in D2 by means of a clearance fit, as defined on page 1 of D2.

Consequently, this connection known from D2 does not permit the features specified in item e) of claim 1 of the present application, according to which the surfaces must be closely adjacent to one another and a locking fit must be provided.

Nor does it appear from the citation D1 that the joining of the elements is effected with closely adjacent surfaces according to the plug-in principle, especially since a surface extending, at least in certain areas, along the outer surface of a cylinder and a surface extending, at least in certain areas, along a hollow cylinder are not provided on each of the two bodies in that document.

- 2.4 The remaining alternatives in claim 1 are also neither known from, nor suggested by, the available prior art.

3. Since claims 2 to 13 are dependent on claim 1, they also comply with the requirements of PCT Article 33(1).

4. The subject matter of independent claim 14 is also neither known from, nor suggested by, the available prior art, for the same reasons as given for claim 1.

5. Since claims 15 to 26 are dependent on claim 1, they also comply with the requirements of PCT Article 33(1).

6. Independent claim 27:

6.1 Claim 27 relates to a device which is characterized as a tool designed as a removing tool.

This tool must be suitable for carrying out the method as per claim 14. It must also be suitable for machining at least one connecting element made of a rigid renewable material and/or the ends of rod-shaped elements to be connected thereto or to each other, each consisting of at least one segment of a material derived from tall plants, in such a way that it (they) obtains (obtain) surfaces extending, at least in certain areas, along well-defined geometrical bodies, a surface extending, at least in certain areas, along the outer surface of a cylinder and a surface extending, at least in certain areas, along a hollow cylinder being produced at the same time on the machined body in the connecting area of a rod-shaped element with a connecting element.

This system consisting of rod-shaped elements and connecting elements is, as already explained in item 3, already known from document D1.

6.2 The feature whereby a removing tool for producing the rod-shaped elements and the connecting elements disclosed in D2 is provided is only one of several obvious possibilities from which a person skilled in the art would choose according to the circumstances

in order to produce the rod-shaped elements and the connecting elements, without thereby being inventive.

- 6.3 Since claim 27 contains no features concerning the joining, according to the plug-in principle, with closely adjacent, complementary surfaces which are suitable for providing a locking fit by means of clamping and/or gluing, the subject matter of claim 27 does not involve an inventive step (PCT Article 33(3)).
7. Dependent claims 28 to 34 do not appear to contain any additional features which, in combination with the features of any claim to which they refer back, could produce subject matter which is novel or involves an inventive step, having regard to the citations in the present proceedings.
- 7.1 The reasons are that the additional features of these claims are either already known from document D2 or result from an obvious combination of features found in the documents cited in the present proceedings, or concern structural modifications which would be straightforward for a person skilled in the art.
8. The subjects of claims 1 to 34 are industrially applicable.
9. Additional observations:
- 9.1 Claim 1 has been duly drafted in the two-part form, but should have been delimited over document D2 (PCT Rule 6.3(b)).
- 9.2 The requirements of PCT Rule 5.1(a)(ii) have not been satisfied, because the description should have cited document D2 and briefly outlined the relevant prior art disclosed therein.

Claims

1. System comprising bar-elements (4,125,126) joined or joinable to form a truss
5 (5), and connecting elements (1,14,21,34,38,52) inserted or insertable between these bar-elements (4,125,126) at their joint places, whereby

a) the bar-elements (4,125,126) consist of at least one segment of a material from high-growing plants each, and

b) the connecting elements (1,14,21,34,38,52) consist of a rigid,
10 regenerative material,

characterised in that

c) at least one end of a bar-element (4,125,126), a connecting element
(1,14,21,34,38,52) which is to be mounted to said bar-element, and/or
the end of a further bar-element (4,125,126) which is to be connected,
15 are treated such that they exhibit surfaces running along well-defined geometrical bodies at least in selected areas,

d) such that at the joint between a bar-element (4,125,126) and a
connecting element or a further bar-element
(1,14,21,34,38;4,125,126), each of both bodies
20 (4,125,126;1,14,21,34,38,52) exhibits at least in a selected area a surface which runs along the surface (11;76) generated by a cylinder, cone, prism or a pyramid, as well as at least in another selected area a surface (11;75) which runs along a hollow cylinder, hollow cone, hollow prism and/or a hollow pyramid respectively,

e) which surfaces permit an assembly by plugging together with closely
25 adjoining surfaces which are suitable for locking by clamping and/or glueing like a fit.

2. System according to claim 1, characterised in that the joint between a bar-
30 element (4,125,126) and a connecting element or a further bar-element (1,14,21,34,38;4,125,126) is designed as a plug-connection (30).

3. System according to claim 1 or 2, characterised in that the joint between a bar-
element (4,125,126) and a connecting element or a further bar-element

(1,14,21,34,38;4,125,126) is designed as a clamping (21,34) or glueing (1,14,38) connection.

4. System according to claim 3, characterised in that for mounting a bar-element (4,125,126) by clamping, a core (23) at the connecting element or at the further bar-element (1,14,21,34,38;4,125,126) is designed to be spreadable and therefore said core can be pressed against the inside (76) of the bar-element (4,125,126).
5. System according to claim 4, characterised in that an element (31) widening conically or like the frustum of a pyramid, is pushed or pulled into an inner, preferably centric cut-out (13) of said core (23), for spreading the core (23).
6. System according to claim 5, characterised in that the connecting element or the further bar-element (1,14,21,34,38;4,125,126) exhibits a cut-out (13) penetrating the core (23) in which the shaft of a screw (27), of a bolt or the like can be inserted to pull an element (31) with widening cross-section into the core (23).
7. System according to one of the claims 4 to 6 characterised in that the connecting element (34) exhibits an annular shape (35), so that the cut-outs (13) for the insertion of a screw-like spreading element (27,31) can extend up to the inside (37) of the ring (35), in order to apply a threaded element or other clamping element at this location.
8. System according to one of the previous claims, characterised in that the connecting element (1,52) exhibits a discoidal shape, e.g. with a circular or ring-shaped, or a triangular, quadrilateral or hexagonal base (7,53).
9. System according to one of the previous claims, characterised in that one connecting element (1,14,21,34,38,52) exhibits at least one surface area of concave shape, in particular a shape which approximately corresponds to a part of the lateral surface of a hollow cylinder, for connecting to the shaft of a bar-element (4,125,126).

System according to one of the previous claims, characterised in that at least one bar-element (4,125,126) exhibits a shaft milled to a round shape at its outer surface.

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11. System according to one of the previous claims, characterised in that a bar-element (4,125,126), which is to be inserted between two connecting elements (1,14,21,34,38,52), exhibits a principally similar structure at both of its ends, i.e. at both ends the surfaces (11;76) running along a cylinder, cone, prism or pyramid are arranged either within or without, respectively, of the surfaces (11;75), which run along a hollow cylinder, hollow cone, hollow prism and/or hollow pyramid in a selected area.

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12. System according to one of the previous claims, characterised in that a bar-element (4,125,126), which is to be inserted between two bar-elements (4,125,126), exhibits a principally different structure at both of its ends, i.e. at one end the surface (11;76) running along a cylinder, cone, prism or pyramid is arranged within the surface (11;75), which runs along a hollow cylinder, hollow cone, hollow prism and/or hollow pyramid in a selected area, at the other end this is the other way round.

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13. System according to one of the previous claims, characterised in that the bar-elements (4,125,126) consist of tubes.

14. Process to produce a truss (5) from bar-elements (4,125,126), which are to be joined, and from connecting elements (1,14,21,34,38,52), which are to be placed between these bar-elements at their joint places, whereby

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a) the rod-like -elements (4,125,126) are made from at least one segment of a material from high-growing plants each, as well as

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b) the connecting elements (1,14,21,34,38,52) consist of a rigid, regenerative material,

characterised in that

c) at least one end of a bar-element (4,125,126), a connecting element (1,14,21,34,38,52) which is to be mounted to said bar-element, and/or

the end of a further bar-element (4,125,126) which is to be connected, are treated such that they exhibit surfaces running along well-defined geometrical bodies at least in selected areas,

- d) such that at the joint between a bar-element (4,125,126) and a connecting element or a further bar-element (1,14,21,34,38,4,125,126), each of both element bodies (4,125,126;1,14,21,34,38,52) exhibits at least in a selected area a surface which runs along the surface (11;76) generated by a cylinder, cone, prism or a pyramid, as well as at least in another selected area a surface (11;75) which runs along a hollow cylinder, hollow cone, hollow prism and or hollow pyramid respectively,
- e) and that surfaces (11;75) processed in such a way are assembled by plugging them together with closely adjoining surfaces which are suitable for locking by clamping and/or glueing like a fit.

15. Process according to claim 14, characterised in that the bodies and/or the surfaces of the parts (4,125,126;1,14,21,34,38,52) which are to be connected are processed by ablating, particularly by cutting.

16. Process according to claim 14 or 15, characterised in that both ends (73) of a bar-element (4,125,126) are processed in such a way, that the (longitudinal) symmetry axes of the processed areas (75;76) are in line with each other.

17. Process according to one of the claims 14 through 16, characterised in that slots (24), which are preferably parallel to the longitudinal axis of the concerned plug-connection (3), are placed in an area, which adjoins the lateral surface (11) of a connecting element or a further bar-element (1,14,21,34,38,52;4), in order to facilitate a radial spring-like movement of (areas 25 of) the concerned generated surface (11).

18. Process according to claim 17, characterised in that a spreading element (31) is inserted in a bore (13), which is parallel or coaxial to the longitudinal axis of a plug-connection (3), in order to permit pressure being exerted in the direction of

(areas 25 of) the generated surface (75) at the end of a bar-element (4) which is to be connected.

19. Process according to one of the claims 14 to 18, characterised in that the bar-
5 elements (4,125,126) are glued or clamped to the connecting elements or further bar-elements (1,14,21,34,38,52;4,125,126) after plugging (30) them together.
20. Process according to one of the claims 14 to 19, characterised in that
10 connecting elements (38) are used as end pieces along the longitudinal edge of the truss (5), which are connectable to a foundation (41), a ceiling, a roof or the like.
21. Process according to one of the claims 14 to 20, characterised in that a
15 panelling or the like is attached at the connecting elements (1,14,21,34,38,52) of the truss (5).
22. Process according to one of the claims 14 through 21, characterised in that
20 bamboo culms (4) are used as bar-elements, whose inner and/or outer lateral surfaces (75,76) at the culms' ends (73) are processed.
23. Process according to claim 22, characterised in that the lateral surface(s)
25 (75,76) of the end (73) of a bamboo culm are processed in such a way, that the wall-thickness of the culm (4) is equal to or less than a predetermined wall-thickness.
24. Process according to one of the claims 22 through 23, characterised in that
30 potentially present diaphragms (nodes) in the bamboo culm (4) are pierced or made passable otherwise.
25. Process according to one of the claims 22 through 24, characterised in that
holes (13) are drilled into a connecting element (1,14,21,34,38,52), which lead into a surface area (12) covered by the face-side of an attached bamboo culm (4), in such a way, that said holes join within the connecting element

(1,14,21,34,38,52) in order to obtain a link between the cavities of the attached bamboo-culms (4).

26. Process according to claim 25, characterised in that, during the creation of lateral surfaces (75,76) at a connection-element which can be plugged together with a bamboo culm (4), the cavity-joining holes (13) drilled into the connection-element (1,14,21,34,38,52) are used as a tool-guiding.
27. Apparatus to carry out the process according to one of the claims 14 through 26, **characterised by** at least one tool (56,113) designed as an ablating tool, in particular as a cutting tool, for machining at least one connecting element (1,14,21,34,38,52) made from a rigid, regenerative material and/or the ends (73) of bar-elements (4,125,126) made from at least one segment of a material from high-growing plants each, which are to be mounted to said connecting element or to one another, in such a way that they obtain surfaces (10,11;75,76) which run along well-defined geometrical bodies at least in selected areas, whereby at the processed body (4,125,126;1,14,21,34,38,52) in the area of the joint of a bar-element (4,125,126) with a connecting element (1,14,21,34,38) there is formed simultaneously a surface which runs along the lateral surface (11;76) of a cylinder, cone, prism or a pyramid at least in selected areas as well as a surface (11;75) which runs along a hollow cylinder, hollow cone, hollow prism and or hollow pyramid at least in selected areas, respectively.
28. Apparatus according to claim 27, comprising at least one tool (113) for processing the ends (73) of a bar-element (4,125,126), characterised by a device (84) for clamping a bar-element (4,125,126) in such a way that both of its ends(73) are as parallel respectively concentric as possible aligned to a longitudinal axis of the processing apparatus (74).
29. Apparatus according to claim 28, characterised by a device (108) at each end of the clamping device (84) for holding and/or mounting of a processing-tool (113).

30. Apparatus according to one of the claims 27 through 29, characterised by a device (111) to guide the processing tools (113) or their holdings (108) respectively in the feeding direction along the longitudinal axis of the processing apparatus (74).

31. Apparatus according to one of the claims 27 through 30, characterised by at least one cutting tool in the shape of a milling head (113) for machining the lateral surfaces (73) at the ends of the bar-elements (4,125,126), which is designed to process the inner and the outer surface (75,76) of a bar-element (4,125,126), in particular a bamboo culm, simultaneously.

32. Apparatus according to claim 27, comprising at least one tool (56) for machining a connecting element (1,14,21,34,38,52), characterised by its design as a tool (56) rotating around an axis (57), with a cutting edge for creating a cavity (9) of rotational symmetry with defined cross-sectional area.

33. Apparatus according to claim 32, characterised in that the cutting region is arranged at a peripheral boundary surface (64) which surrounds a central guiding device (60).

34. Apparatus according to claim 33, characterised in that the central guiding device (60) is designed as a drill, so that the guiding drill-hole (13) and the plugging cavity (9) can be produced in one work step.